

Descriptions of the Male of *Riekia nocatunga* Richards, the Male and Two Strikingly Distinct Sympatric Colour Forms of *Riekia confluens* (Snelling) and the Male of *Rolandia angulata* (Richards) (Hymenoptera: Vespidae: Masarinae) from Australia

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Abstract.—The male of *Riekia nocatunga* Richards from southern Queensland, the male and two strikingly distinct sympatric colour forms of *Riekia confluens* (Snelling), comb. nov., from Western Australia, and the male of *Rolandia angulata* (Richards) from southern Queensland are described. The characters distinguishing *R. nocatunga* and *R. confluens* are discussed.

The Australian Masarinae and their natural history are relatively poorly known. During a recent collecting trip to Australia by the author, S.K.Gess and R.W.Gess, material collected included males of three species, *Riekia nocatunga* Richards, *Riekia confluens* (Snelling), comb. nov., and *Rolandia angulata* (Richards), hitherto described only from the female sex. Two strikingly distinct sympatric colour forms of *Riekia confluens* were found to occur. One of these was previously unknown and helps to elucidate the identity of a single male *Riekia* collected by T.F.Houston and discussed by Snelling (1986) who was unable to place it in a species.

Riekia Richards, 1962 and *Rolandia* Richards, 1962 have been sunk as junior subjective synonyms of *Metaparagia* Meade-Waldo, 1911 by van der Vecht and Carpenter (1990) on the basis of an as yet unpublished cladistic analysis by Carpenter. Until such time as this analysis is published and may be studied, the present author considers it best to continue to accept *Riekia* and *Rolandia* as genera in their own right.

Institutions in which the material studied is deposited are: Albany Museum,

Grahamstown, South Africa (AMG); Australian National Insect Collection, Canberra (ANIC); Western Australian Museum, Perth (WAM).

***Riekia nocatunga* Richards**

Riekia nocatunga Richards, 1962: 55-57, female.

This species was described from 7 miles N of Nocatunga [on maps as Nockatunga] [27.40S, 142.40E], Queensland (not New South Wales as in Richards 1962; correct in Richards 1968) (holotype female and 4 female paratypes) and Bourke [30.09S, 145.59E], New South Wales (1 female paratype).

Subsequently an additional five females from 90 km W of Cobar, Barnato Tanks [31.38S, 144.59E], New South Wales, were attributed to this species by Richards (1968). He noted that they differed from his original description with regard to the pale markings of which he gave some details. Two of these females, in the collection of the Natural History Museum, London, have been examined by the present author. They are confirmed as being *R. nocatunga*. They are less melanistic than the specimens originally described. The dark areas are less extensive and some, in par-

ticular those on the pronotum and tergites 1 and 2, are brownish rather than black. The light areas are more extensive and their colour is a strong yellow rather than pale lemon-yellow.

Snelling (1986) figured and briefly discussed a male *Riekia* from 43 km ENE Lander Homestead (25.08S, 116.54E) in Western Australia. Whereas it agreed generally with the original description of *R. nocatunga*, Snelling stated that there was no certainty that it was the opposite sex of that species and that he suspected that it was not. He listed some discrepancies, allowance being made for sexual differences, and stated that more material would have to be available before the specific status of the male could be determined.

Recently collected *Riekia* material, of relevance to the clarification of the above taxonomic question, consists of associated females and males from both Queensland and Western Australia. The specimens from Queensland are certainly *R. nocatunga*, as established by the comparison by the author of several of the females with the holotype in the Australian National Insect Collection, Canberra. The specimens from Western Australia on the other hand represent two strikingly distinct colour forms of *Riekia confluens*. One is superficially similar looking to *Riekia nocatunga* but morphologically distinct. The males of this form show the characters noted by Snelling for his male.

Male.—(Figs 3 and 4). Colour pattern very similar to that of female but differing in that the following parts are pale lemon-yellow: small streak on scapes distally, entire clypeus other than for narrow lateral and anterior margins, single large frontal spot between and above antennal sockets, narrow streak margining lower orbits, elongate spot in lower half of each ocular sinus (not rising above upper limit of frontal spot and separated from it by about width of antennal socket), uninterrupted but posteromedially narrowly emarginate pronotal band connecting humeri. Spot on

each side of mesoscutum where its furrows meet pronotum (usually but not always present in females) absent in both males examined.

Antennal scape (with radicle) very slightly longer than interantennal distance; first flagellomere less than half (0.4) as long as scape (with radicle), one and a third times as long as wide at its distal end, and one and one fifth as long as the second flagellomere. Last three flagellomeres flattened and slightly concave beneath; ultimate flagellomere narrowing apically and distinctly curved to form a hook.

Tergite 7 evenly rounded apically.

Genitalia (Figs 3 and 4); parameral spine broad and thick, evenly curved over its length and not hook-like apically; ventral process of each paramere relatively broad and short, subtriangular, without a narrow elongation; digitus short.

Length 7.5–7.8 mm; length of forewing 5.8 mm, hamuli 14.

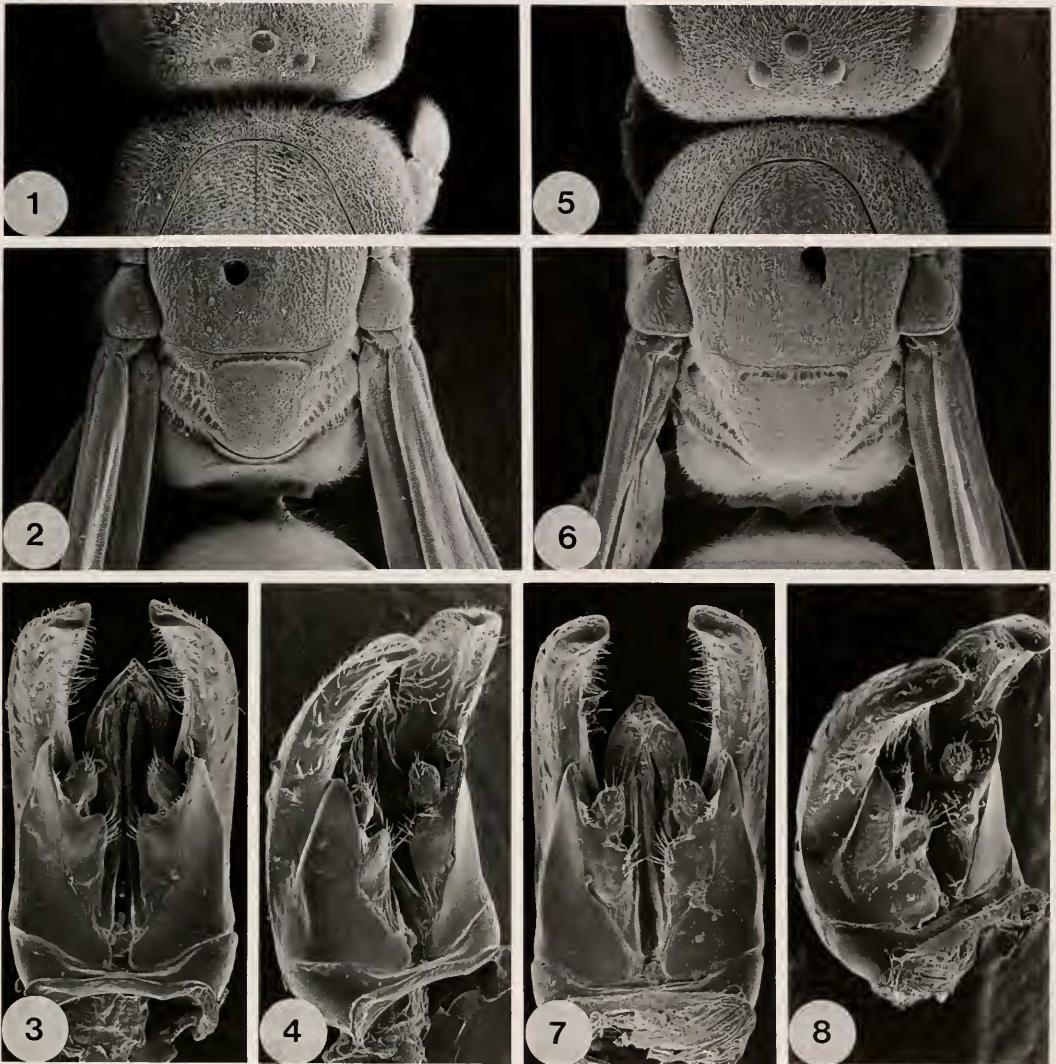
New Material Examined.—Queensland: Lundavra State School, Kondar (28.08S, 149.51E), 25.x.1993 (F.W., S.K. & R.W.Gess) 11 females, 1 male (in yellow flowers of *Goodenia fascicularis* F.Muell. & Tate, Goodeniaceae); Southwood Road, western boundary of Southwood National Park (27.56S, 149.30E), 26.x.1993 (F.W., S.K. & R.W.Gess) 2 females (at water); 85 km E of St George (28.03S, 148.30E), 27.x.1993 (F.W., S.K. & R.W.Gess) 8 females, 1 male (in yellow flowers of *Goodenia pinnatifida* Schldl., Goodeniaceae). Two females and 1 male in ANIC; 2 females in WAM; rest of material in AMG.

***Riekia confluens* (Snelling) comb. nov.**

Paragia confluens Snelling, 1986: 14 and Fig. 28, female.

Riekia sp. Snelling, 1986: 6, 8 and Figs 10, 19–21, male.

Snelling (1986) erroneously described *confluens* as a species of *Paragia* Shuckard, 1837 despite the fact that, in his own



Figs. 1-4. *Riekia nocatunga*. 1, dorsofrontal view of vertex and dorsal view of anterior third of thorax of female ($\times 17.6$); 2, dorsal view of posterior third of thorax of female ($\times 17.6$); 3-4, ventral and ventrolateral views of genitalia of male ($\times 57$).

Figs. 5-8. *Riekia confluens*. 5, dorsofrontal view of vertex and dorsal view of anterior third of thorax of female ($\times 17.6$); 6, dorsal view of posterior third of thorax of female ($\times 17.6$); 7-8, ventral and ventrolateral views of genitalia of male ($\times 63$); [all lemon-yellow colour form]

generic key, the species with its unrestricted gastral tergum 2 runs down to *Riekia* Richards, 1962. Further, with the exception of the number of spine-like setae at the apex of the mid- and hindtibiae (a specific character) the characters given by him in his diagnosis of the species are

all common to both *confluens* and *nocatunga* and may therefore be considered to be generic characters pertaining to *Riekia*. Similarly the confluence of the postocular and preoccipital carinae (leading to the name *confluens*), or alternatively the absence of the postocular ca-

rina, is a character shared with *nocatunga*. Conversely, the same characters set *confluens* (and *nocatunga*) generically apart from *Paragia*.

Material collected at a single site near Carnarvon, Western Australia, at distances of 165 km and 260 km in a westerly and west-south-westerly direction respectively from the type localities of *confluens* (16 km WSW Lyons River Homestead, 24.38S, 115.20E—paratype female, and 36 km ESE Minnie Creek Homestead, 24.00S, 115.42E—holotype female) consists of 53 females and 4 males. The material is divisible into two very distinct groups, one black and reddish-brown and the other black and lemon-yellow. Whereas intra-group variability is negligible, inter-group differences with respect to colour generally and to colour pattern on the metasoma in particular are striking.

The distinctness of the two sympatric groups and the notable absence of any intermediate forms initially led to the belief that two species were represented. However, no morphological characters could be found that supported this view and it is concluded that the apparent difference in overall facies is a product of the differences in colour and colour pattern. The reddish-brown colour form, consistent with the description of Snelling's two females (particularly with that of the paratype), is represented in the present material by females only, the lemon-yellow colour form by both sexes. To facilitate intra-specific comparison, descriptions limited to colour pattern are given of both female forms whereas for the purpose of inter-specific comparison with *nocatunga* the description of the male is given in greater detail.

In passing it is noted that in Snelling's description it is incorrectly stated that the probasitarsus is slightly more than twice wider than long. This is clearly an inadvertent error as it is in fact slightly less than half as wide as long.

Reddish-brown (RB) Colour Form

Female.—Black. The following reddish-brown: mandibles other than for teeth and extreme base, upper half of clypeal disc, a variously developed transverse band (seemingly formed of a pair of medially fused spots) between and above antennal sockets and narrowly separated ventrally (where sometimes angularly emarginate) from clypeal marking, variously sized elongate spot in upper half of each ocular sinus (rising to level of anterior ocellus and exceeding upper margin of frontal marking) [median frontal transverse band and lateral spots sometimes broadly fused above], a large oval spot behind eyes dorsally, entire upper surface of prothorax other than for narrow streak bordering posterior margin, tegulae except for clear testaceous central spot and narrow margin, scutellar disc other than for its anterior margin, a large spot on raised part of axillae and a minute spot between it and tegula, a diffuse spot on metanotum medially, a large spot on angles of propodeum, large spot on mesopleuron below tegula, distal end of mid- and hindcoxae, part of foretrochanter and whole of mid- and hindtrochanters, femur, tibia and tarsomeres of all legs, gastral tergite 1 other than for anterior declivity, tergite 2 other than for a variously developed anterior black band which may be triangularly produced in the middle and for a pair of widely separated diffuse dark markings on posterior margin, an anteriorly pointing triangular spot on posterior margin of tergite 3, tergite 4 other than for a narrow anterior black band, tergite 5, diffuse transverse posterior band on gastral sternites 2–5 (those of sternites 2 and 3 and sometimes 4 strongly and widely anteriorly produced in the middle).

Lemon-yellow (LY) Colour Form

Female.—(Figs 5 and 6). Black. The following reddish-brown: tip of mandibles except actual teeth, flagellomeres 1–10 be-

neath, trochanters of mid- and hindlegs, proximal half to three quarters of outer aspect of femora (where moderately to heavily black suffused) and inner and lower aspect of same, inner and lower aspect and distal end of tibiae, all tarsomeres, posterolateral portions of dark markings on sternites 2–4 and sternite 6 apically (all black-suffused). The following lemon-yellow: proximal half to two-thirds of mandibles, subapical spots on scapes, clypeus other than for narrow lateral and anterior margins and in some specimens arcuate black lines on distal half, a pair of irregularly shaped frontal spots between and above antennae, a narrow streak on lower inner orbits flanking clypeus, a broad mark in ocular sinus rising to level of anterior ocellus, an oval spot behind eyes dorsally, uninterrupted but posteromedially narrowly emarginate pronotal band connecting humeri, posterior corner of pronotum, tegulae except for clear testaceous central spot and narrow margin, a large transverse suboval shield-like spot on scutellum (not quite reaching anterior margin), a small spot on raised part of axillae, a large spot on angles of propodeum, large spot on mesopleuron below tegula, a small spot on mesosternum anterior to coxal cavities, a small lateral spot on mid- and hindcoxae, distal half of outer aspect of forefemora, distal spot on outer aspect of mid- and hindfemora, outer aspect of all tibiae (except distal ends), wide anteriorly trilobed posterior band on gastral tergites 1–5, tergite 6 (other than for variously developed posteriorly pointing V-shaped black mark leaving lateral and median spots or almost eliminating these), transverse posterior band on gastral sternites 2–5 (those of sternites 2 and 3 trilobed with median lobe strongly and widely anteriorly produced).

Male.—(Figs 7 and 8). Colour pattern very similar to that of female but differing in that the following parts are pale lemon-yellow: entire anterior aspect of scapes, entire clypeus other than for narrow lat-

eral and anterior margins, single large frontal spot between and above antennal sockets, lower aspects of mid- and hindcoxae, entire outer aspect of midfemora, entire outer aspect of all tibiae (including distal ends), narrow longitudinal streak on all basitarsi, transverse posterior band on gastral sternites 2–5 (all with median lobe strongly and widely anteriorly produced, together giving the effect of a wide median longitudinal band).

Antennal scape (with radicle) very slightly longer than interantennal distance; first flagellomere slightly more than half (0.53) as long as scape (with radicle), one and three quarter times as long as wide at its distal end, and twice as long as the second flagellomere. Last three flagellomeres flattened and slightly concave beneath; ultimate flagellomere narrowing apically and distinctly curved to form a hook.

Tergite 7 truncate and narrowly transverse apically.

Genitalia (Figs 7 and 8); similar to those of *R. nocatunga* but differing in detail particularly with respect to the form of the inwardly directed lobe of the volsella below the digitus.

Length 7.8–8.3 mm; length of forewing 5.5–5.7 mm; hamuli 12–13.

Material Examined.—Western Australia: 8 km NE of Carnarvon (24.51S, 113.45E) on road to Bibbawarra Bore, 3–5.x.1993 (F.W., S.K. & R.W. Gess) 16 RB females, 29 LY females and 4 LY males (in yellow flowers of *Lechenaultia* sp., Goodeniaceae), 4 RB females, 1 LY female (at water), 2 RB females, 1 LY female (without biological data). Two RB females, 2 LY females and 1 LY male in both ANIC and WAM; rest of material in AMG.

Discussion.—*R. confluens* may be distinguished from *R. nocatunga* in both sexes by the colour pattern and the below indicated morphological characters.

In *R. confluens* the ratio of POL (distance between posterior ocelli):OOL (distance between a posterior ocellus and nearest

eye margin) is 1:1.3–1.4, whereas in *R. nocatunga* it is 1:1.0–1.1.

In *R. confluens* the pilosity of the pronotum is only moderately dense, the individual hairs being slender and only slightly curved apically whereas in *R. nocatunga* the pilosity is much denser and the individual hairs are more robust and markedly and evenly curved.

In *R. confluens* the scutellum (Fig. 6) has its disc posteriorly widely and evenly to bluntly rounded and abruptly declivitous to the metanotum which it slightly overhangs; the posterolateral free edge of each lateral wing is almost straight. The metanotum in its median third is not depressed middorsally and is therefore of greatest depth in the middle; it is vertical, not visible from above. In *R. nocatunga* the scutellum (Fig. 2) has its disc posteriorly narrowly rounded and gradually descendant to metanotum which it does not overhang; the posterolateral free edge of each lateral wing is widely and shallowly concave. The metanotum in its median third is somewhat depressed middorsally and is therefore of even depth; it is sloping, visible from above.

In *R. confluens* gastral tergite 1 is two and two-fifths to two and a half times wider than long whereas in *R. nocatunga* it is two and a quarter times wider than long.

In *R. confluens* the number of spine-like setae on the apex of the mesotibia is 1 whereas in *R. nocatunga* it is 2–4, most commonly 3; the number of such setae on the apex of the metatibia is 1–2, most commonly 1, and 2–3 respectively.

The species differ in the female sex in the form of the pronotum as seen from above. In *R. confluens* (Fig. 5) the anterior and lateral margins describe a semicircle whereas in *R. nocatunga* (Fig. 1) the "shoulders" are anterolaterally produced so that the anterior and lateral margins do not describe a semicircle but the anterior margin appears subtransverse.

As may be seen from the descriptions,

the species differ in the male sex in the relative proportions of the first two flagellomeres, in the form of gastral tergite 7 and in slight differences in the genitalia.

Present data would indicate that the distributions of the species are widely separated, *R. nocatunga* occurring in New South Wales and Queensland and *R. confluens* in Western Australia.

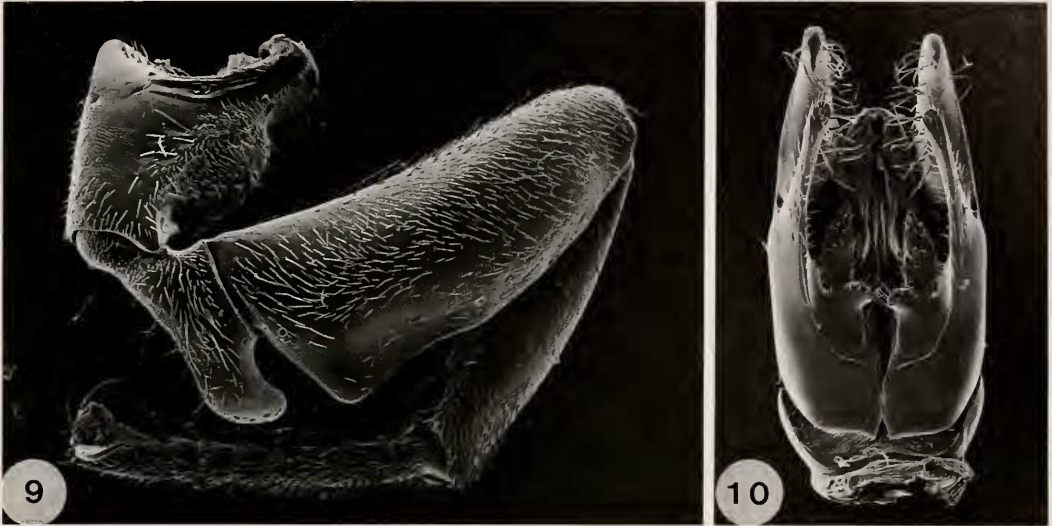
Rolandia angulata (Richards)

Riekia angulata Richards, 1968: 101–102, female.
Rolandia angulata (Richards), Snelling, 1986: 8.

This species was described from Cunnamulla [28.04S, 145.40E], Queensland (holotype female and 1 female paratype) and from 90 km W of Cobar, Barnato Tanks [31.38S, 144.59E] (about 400 km south of Cunnamulla), New South Wales (12 female paratypes). Snelling (1986) recorded an additional 8 females from Cunnamulla. Hitherto the male appears to have been unknown. One of the present females was compared with the holotype in the Australian National Collection of Insects, Canberra, and found to be identical.

Male.—(Figs 9 and 10). Colour pattern very similar to that of female, differing chiefly in that the yellow markings are lighter in hue and brighter and contrast more strongly with the light reddish brown areas. The bright yellow mandibles, clypeus and transverse lower frontal marking, and the distinct median and lateral spots on the gaster facilitate recognition of the male even in the field.

Antennal scape (with radicle) shorter than interantennal distance; first flagellomere three times as long as broad at its distal end, about two-thirds as long as scape (with radicle) [three-quarters as long as scape without radicle], and a little more than twice as long as second flagellomere; flagellomeres 3–9 subequal in length and with the exception of 3 wider than long; 3–7 increasing in width; 7 and 8 of same width; 9 as wide as 6; 10 slightly longer



Figs. 9–10. *Rolandia angulata*. 9, posterior view of right fore leg of male ($\times 44.5$); 10, ventral view of genitalia of male ($\times 44.5$).

than preceding flagellomeres, narrowing and apically rounded; distal flagellomeres not modified beneath.

Foreleg (Fig. 9); process of foretrochanter large, compressed, broadly digitiform in posterior view and slightly forwardly curved, its apex attaining level of angulate base of forefemur; forefemur in posterior view broad and ventrally strongly angulate at base and widely but shallowly incurved from there to about midlength, with ventral margin angulate along its length but becoming lamellate at basal angle, with ventral surface basally (i.e. adjacent to lamellate ventral angle) excavated.

Genitalia (Fig. 10); parameral spines apically sharply pointed and ventrally recurved; ventral process of each paramere tapering towards apex in lateral view but in ventral view more or less of even width over most of its length and apically narrowly rounded; digitus and inwardly directed lobe of volsella as figured.

Length 8.7–9.2 mm; length of forewing 6.3–6.5 mm, hamuli 16–18.

Material Examined.—Queensland: 85 km E of St George (28.03S, 148.30E), 27.x.1993

(F.W., S.K. & R.W. Gess) 6 females (in yellow flowers of *Goodenia cycloptera* R.Br. in C. Sturt, Goodeniaceae), 7 females (in yellow flowers of *Goodenia pinnatifida* Schldl., Goodeniaceae); 27 km W of St George (28.03S, 148.30E), 28.x.1993 (F.W., S.K. & R.W. Gess) 31 females, 10 males (in yellow flowers of *Goodenia cycloptera* R.Br. in C. Sturt, Goodeniaceae), 1 female (in yellow flowers of *Goodenia pinnatifida* Schldl., Goodeniaceae), 2 females (nesting in sandy soil), 2 females, 3 males (without biological data); 80 km E of Cunnamulla (28.04S, 145.40E), 29.x.1993 (F.W., S.K. & R.W. Gess) 49 females, 31 males (in yellow flowers of *Goodenia pinnatifida* Schldl., Goodeniaceae), 4 females (nesting in sandy soil), 9 females, 2 males (without biological data). Three females and 3 males in ANIC; 3 females and 3 males in WAM; rest of material in AMG.

Discussion.—Snelling (1986) was correct in his assumption that the males of *R. angulata* would differ from those of the very similar *R. houstoni* in the same characters as do the females. Of particular note is the scutellum which in both sexes of *R. angulata* slopes evenly to the metanotum and

lacks a definite posterior face. The males run down satisfactorily in Snelling's key, allowance being made for the longer than broad second flagellomere.

ACKNOWLEDGEMENTS

The author wishes to thank Ian Naumann and Jo Cardale of the Australian National Insect Collection, Canberra for hospitality in their department and for facilitating the comparison of some of the present specimens with type material in their care, Kirsten Cowley of the Australian National Herbarium, Canberra for identifying the forage plants, Suzanne Lewis of the Natural History Museum, London for lending material under her care, and Robin Cross of the Electron Microscopy Unit, Rhodes University, Grahamstown for producing the scanning electron micrographs reproduced as Figs 1–10. An earlier version of the manuscript was reviewed by Karl V. Krombein of the Smithsonian Institution, Washington and James M. Carpenter of the American Museum of Natural History, New York. The latter, in particular, is thanked for his constructive critique and for drawing attention to a potential synonymy arising from the fact that *R. confluens* had been described by Roy Snelling as a species of *Paragia*, a genus to which the wasp

in question quite clearly does not belong. Gratitude to the South African Foundation for Research Development is expressed for a rolling support grant which made the field work in Australia possible.

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